

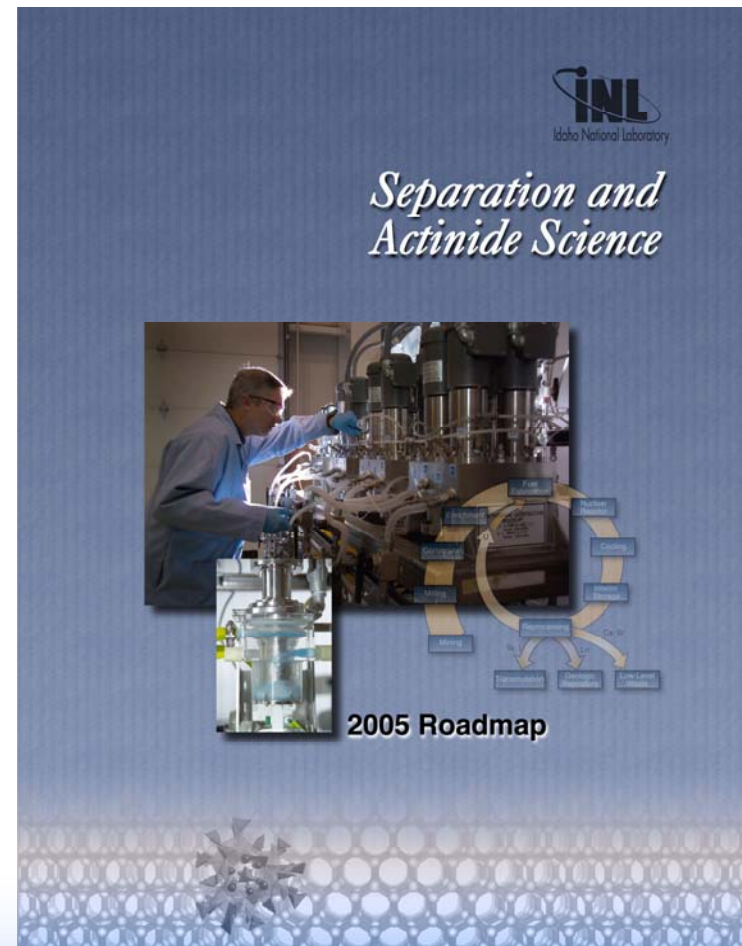
Separations and Actinide Science Signature Activity Roadmap

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Goal of the Separations and Actinide Science Signature

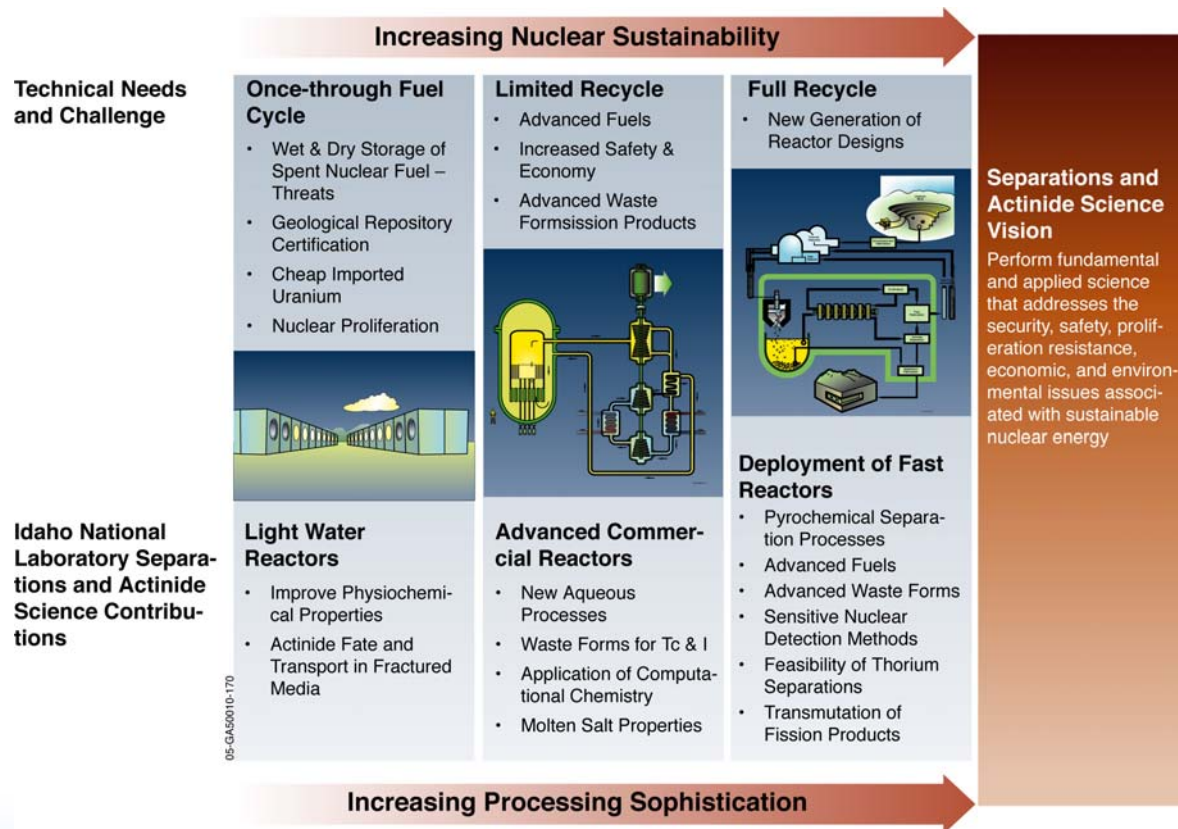
- **Establish a nuclear technology science base to:**
 - Underpin the development of an advanced fuel cycle
 - Provide inherently safe high-temperature nuclear fuels
 - Eliminate the potential production of nuclear weapons through reprocessing of spent fuel
 - Permit environmentally safe Management of associated waste



Why Create this Signature?

- **What was done in the past is not acceptable**
 - **Long-term Storage of Spent Nuclear Fuel**
Growing issue and represents terrorist risk
 - **PUREX Reprocessing Presents Proliferation Risk**
 - **Better Data Needed for Certification of Repository**
- **New Reactor Designs Require Advanced Ceramic Fuels**
- **New Waste Forms Need to be Certified**
- **Desire to Reduce Environmental Impact of Nuclear Technology Drives New Process Development**

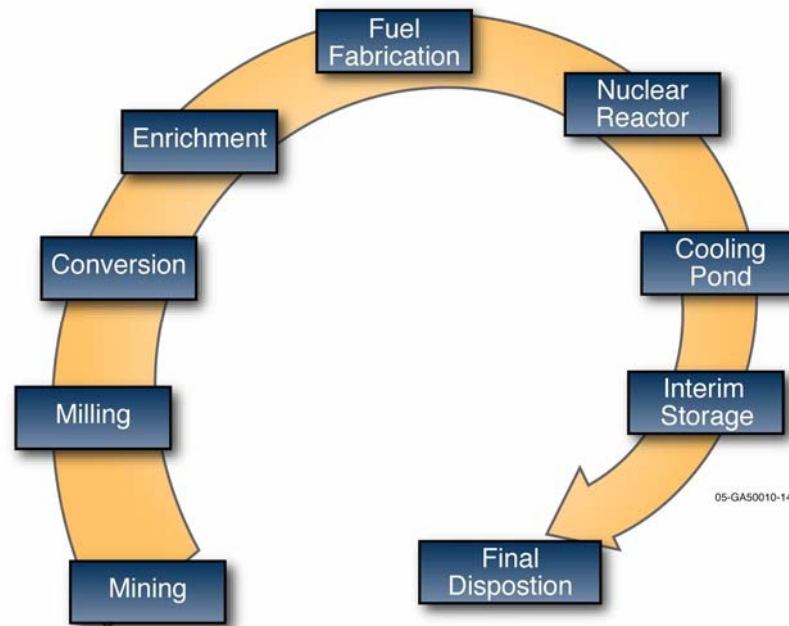
The Challenges to Separations Technology and Relevant Actinide Science related to Nuclear Technology Development



Specific Challenges

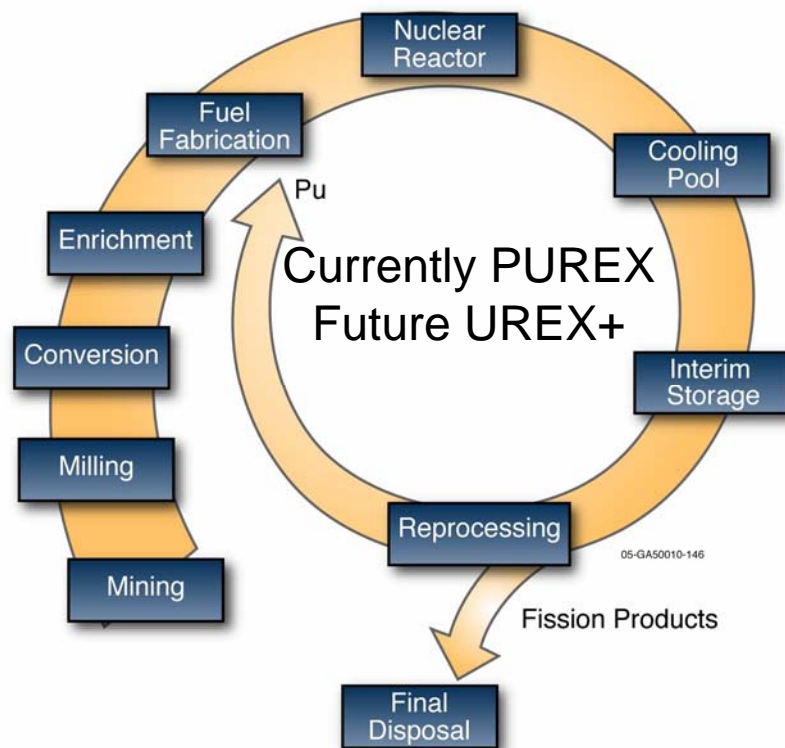
- **Once-through Fuel Cycle**
- **Limited Recycle**
- **UREX+ Aqueous Process**
- **Closed Fuel Cycle**
- **Implementation of Pyrochemical Fuel Reprocessing**
- **Alternate Fuel Cycles**
- **Fuel Cycle Safe Guards**

Once-through Fuel Cycle

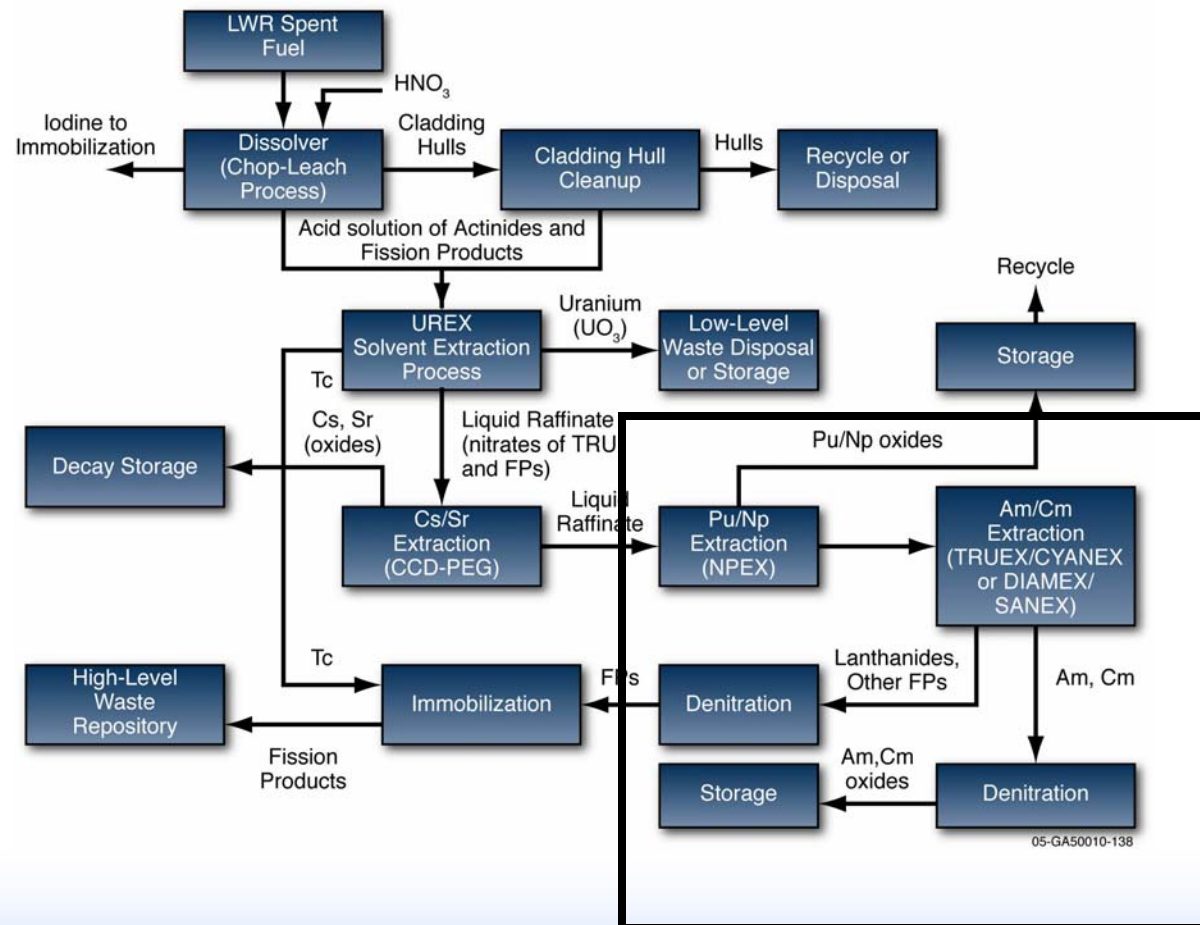


77,000 metric
Tons (2010)

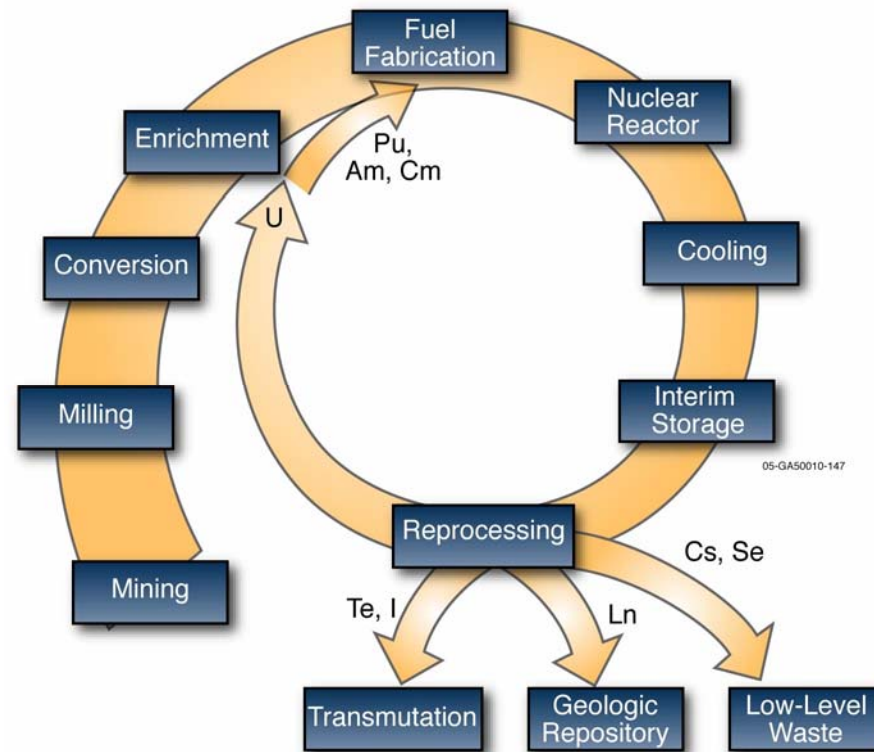
Limited Recycle



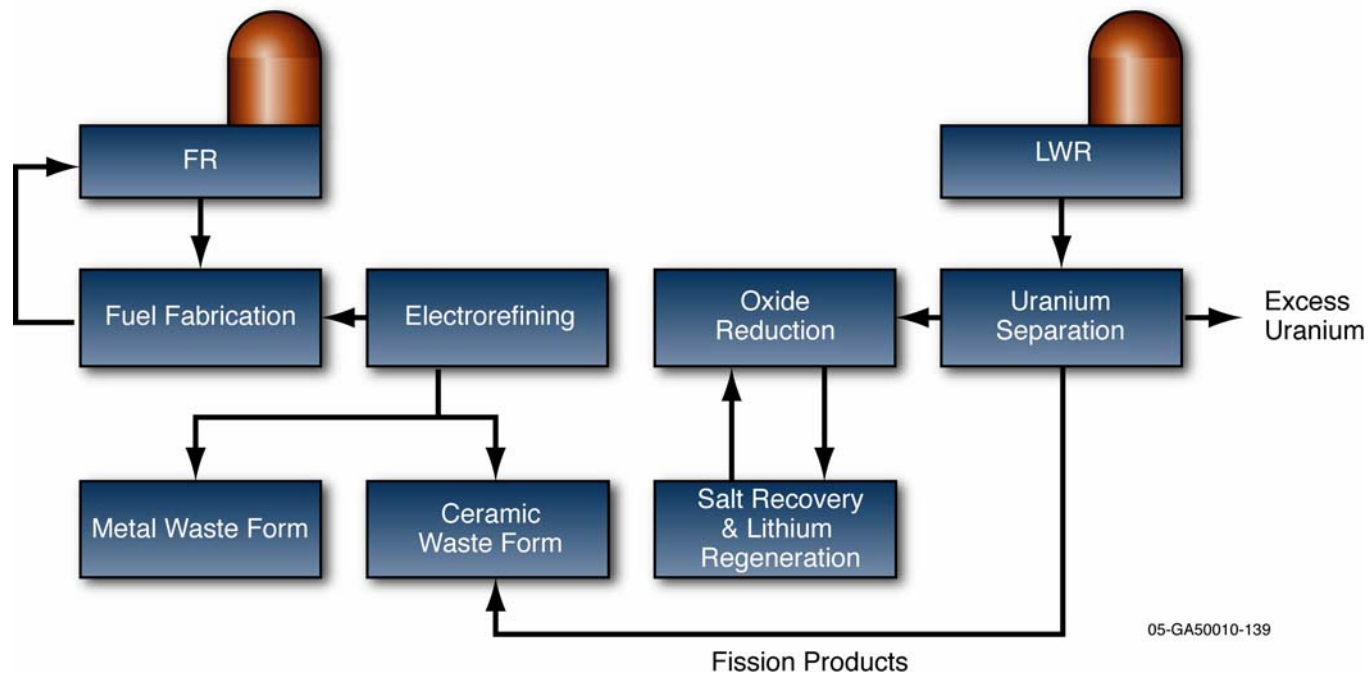
Uranium Extraction Process (UREX)



Full Recycle with Repository Optimization



Combined UREX and Pyrochemical Reprocessing



Path Forward

People	Hire Group Leader Key Personnel Hit List Pyrochem/Electrochem Hire	Separations Lead Hire Implement Post-Doctoral Program Staff Hiring	Sabbatical Program Implementation
Facilities	EA for IRC RTC Radioanalytical Lab MOUs with Other Institutions	IRC Modifications MFC Lab Construction Process Development Lab CD-0; CD-1	Process Development/R&D Laboratory Construction
Equipment	Develop Acquisition Plan Purchase High Value Item Acquire Routine Equipment	Acquire One-of-a-Kind Piece of Equipment Acquire Upgraded Routine Equipment	Establish Mass Spec User Center Establish Actinide Chem User Center
Collaborations	Develop Joint Program with Washington State University Develop Joint Program with UNLV	Collaboration with Klophlin Institute LANL Collaboration Nuclear Detection Institute	Actinide Chemistry Institute
Programs	Develop Business Plan Identify Relationship Mgr. Proposal to AFCI	Proposal for NESP First Round of NESP Awards Proposal for Actinide Chem Institute	Proposal for Actinide Chem Institute
	Near-Term	Mid-Term	Long-Term

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